

33 Gigasample/Second Transient Digitizer

Low-cost CAMAC module functions like an oscilloscope



LNL has developed a replacement for costly, cumbersome oscilloscopes — a transversal sampling array (TSA) that can digitize single-shot transients at 33 GS/s. This low-cost, computer automated measurement and control (CAMAC) module is based on a highly parallel, distributed architecture that combines high-speed sampling diodes with LLNL-developed fast gate-pulse generation techniques. An order-of-magnitude advance in digitizing rates has been achieved with a 10-bit dynamic range, versus 6 bits for integrated digitizers.

APPLICATIONS

- Physics diagnostics
- Impulse-radar-receiver
- Streak-camera replacement
- Semiconductor and automatic test equipment
- Digital-storage-oscilloscope (DSO) front end

Configurable to meet specific needs

The TSA can be configured to sample electrical signals at rates from less than 10 GS/s to greater than 100 GS/s, with sampling apertures below 10 ps. Our CAMAC digitizer presently features a 30-ps sample spacing, a 60-ps rise time at 6-GHz bandwidth, and a 60-dB dynamic range

with 2-ps rms jitter. As many as 10 channels (with either 2- or 4-ns records per channel) are available. The unit has been implemented in SMT for cost effectiveness; however, it could be integrated into MMIC for compact size and higher performance.

The maximum repetition rate is 5 kHz, although rates of up to 1 MHz are possible and can include analog sample integration for enhanced signal-to-noise ratios in radar receiver applications. Although currently designed for single-shot transient capture, the unit could be reconfigured for continuous or long-record-length operation.

Oscilloscope-like output

To eliminate sampling artifacts, the digitizer combines anti-alias filtering and contiguous sampling with careful sample reconstruction. Its digital output is processed using LabView software, and the displayed trace is indistinguishable from that of a real-time oscilloscope.

Availability: This technology is available now. The Laboratory is seeking licensees for the 33-GS/s Transient Digitizer.

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